Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

EMBRYOLOGY.[1]

THE QUADRATE PLACENTA OF SCIURUS HUDSONIUS; OR, THE COMMON RED SQUIRREL.—In 1887, the present writer called attention to the existence of certain vestigiary placental structures developed during the early stages of the mouse, rat and field-mouse, which indicated that the discoidal placental disk of the late stages of fœtal life of these forms had been derived from one, the placenta of which was zonary or girdle-like in form, as in the cat, dog, hyrax, elephant, etc. All of the forms of rodents mentioned, however, possess at a late stage a very distinctly discoidal placenta, the development of which seems to be associated with the so-called *inversion of the germ layers*, which is so marked a feature of their ontogeny, and one also which renders its processes amongst the most specialized and complex known to embryologists. The notice published in September, 1887, as to the persistence of a girdle-like vestige of the decidua continuous with opposite sides of the placental disk, afforded only tentative evidence of the derivation of the discoidal placental from the zonary form. Recently some remarkably conclusive evidence, favoring such a view, has fallen under my observation in fœtuses of the common red squirrel. Mr. J. P. Moore, one of the pupils in the biological laboratory of the University of Pennsylvania, during the latter part of March, brought in a gravid female red squirrel in which two fœtuses were found, *in utero*, which are the basis of the following account.

These fœtuses measured 16 mm. in length from the vertex of the head to the end of the body. The two cerebral vesicels had just appeared as a pair of smooth saccular diverticula from the sides of the anterior end of the neural tube. The spinal cord filled out the vertebral canal entirely, and the two enlargements, brachial and lumbar, were distinctly visible through the integument of the dorsal median line. The limbs were so far developed as to show the digits distinctly differentiated. The stage, in fact, represents one which is very nearly equivalent to that of the human embryo at three months.

The peculiarity of the most importance in the present case, in relation to the question of the origin of the discoidal placenta in other forms, is the unusual shape presented by that organ, which is quadrate in *Sciurus hudsonius*. Both fœtuses were found in one horn. They formed ovoidal swellings of the uterine cornu separated from each other by a slight interval. They were nearly an inch long and not quite three-fourths of an inch in diameter. Upon carefully inserting the point of a scissors through the uterine wall ventrally, and opening it so as to expose the embryo in its membranes, it was found that the latter were not adherent to the mucosa, except over a small quadrate area on the mesometric side. After the placenta was forcibly detached with part of its decidua, the scar left on the uterine wall measured 9 mm. in length over its short diameter which coincides with the direction of the passage in the cornu. Its diameter the other way or transversely to the uterine cornu was 12 mm. The edges of the scar forming its short diameter were slightly elevated so as to form a pair of slight folds projecting above the non-placental area above and below the embryo. These folds represent a very rudimentary decidua reflexa, traces of which are also present in forms with a zonary placentation. The edges of the scar forming the margins of its long diameter pass gradually into the mucous membrane of the uterine walls, and there is no such well-marked fold representing a reflexa as appears on the other sides. The peculiar quadrate form of the placenta was equally manifest in its fœtal part, or that to which the umbilical cord and membranes are attached. The area of the placenta in millimetres is, in round numbers, 9x12 = 108 sq. mm. Over all the remaining portions the fœtal membranes were not attached to the uterine mucosa. There was a strongly developed *decidua vera* over the placental area.

---

[1] This department is edited by Professor JOHN A. RYDER, University of Pennsylvania, Philadelphia.

If we now compare this peculiar quadrate placenta with the ordinary zonary type the homologies of its parts will become clear, and I think it affords demonstrative evidence of the direct derivation of this quadrate form from one which was zonary. If, for example, we select the zonary type, as seen in the cat of the third or fourth week of intra-uterine life, and mark off a quadrate portion of the placental girdle which will be as 9 is to 12, 9 being the width of the girdle and 12 the proportional length of a segment of it measured along its curve, we shall have a placenta which is the morphological equivalent of that seen in the red squirrel.

In the rabbit's uterus of the eighth day of gestation there is a proliferation or thickening of the dorsal or mesometric side of the uterine wall, which betrays distinct traces of a squarish figure. As this represents the site of the future placenta in the rabbit it is plain that the squirrel has retained in a far more pronounced manner traces of the primitive girdle-like placenta. It seems, in fact, as if that portion of the placental girdle directed away from the blood supply had been suppressed, leaving, as in the case of the red squirrel, only a segment of the original zonary placenta on the mesometric side.

This diversity in the form of the placenta, even in types where the uterus is divided into a pair of tubular cornua, is associated with the mode of vascular supply of the uterine walls. In the cat, mouse and rabbit there is present a rich plexus of vessels all round the uterine tube interposed between the outer and inner muscular coats. The mouse has very few uterine glands, the rabbit and cat on the other hand have them very numerously imbedded in the wall of the mucosa. The area where active proliferation of the uterine wall goes on together with hypertrophy of the uterine gland differs greatly in form in different types. In the mouse the hypertrophy is at first mainly confined to the connective tissues of the uterus; in the rabbit, cat and squirrel it is at first mainly associated with changes in the size, form and thickness of the walls of the tubular glands. All of these phenomena in turn are associated with the manner in which the blood supply for the maternal placenta is distributed. If the blood-vascular supply is developed mainly on the mesometric side, there appears to be a tendency to develop a discoidal placenta from the dorsal segment of the uterine mucosa which is in contact with the embryo and its membranes. If the blood-vascular supply of the uterine walls persists around the whole circumference of the tubular horn of the uterus there will be a tendency to develop a girdle-like placenta, as in the cat. If the muscular supply of the uterus opposite the mesometric side is, on the other hand, suppressed to any great degree, the continuation of the placenta fails to be formed on that side, and the quadrate segment of the girdle leading finally to the discoidal form is developed. As I have shown in a former note, that the mode of contact of the tubular uterine wall with the spherical ovum had something to do with the evolution of a zonary type of placentation, it may be well to indicate in this connection that there is also a physiological factor to be considered in the blood supply of the uterus during gestation and the way in which such supply is modified. The factors at work in the differentiation of the placenta in the mammalia may be said to be mechano-physiological in character. The method of the establishment of formal relations between the surfaces of the embryo and parent during fœtal development are purely mechanical. These primary conditioning factors are further modified by changes in the physiological processes incident to gestation. While these points just insisted upon must be borne in mind in working out a final interpretation of the method of evolution of the various forms of the placenta, the quadrate placenta of the red squirrel appears to be of great significance, as bridging the gap between the discoidal and zonary forms; it plainly shows how the passage from the one to the other was effected. This is all the more interesting from the circumstance that both square and round forms are met with in one and the same order, but in different suborders.

Recently my views as to the origin of the amnion and placenta have been criticized by Minot in the *Journal of Morphology*, ii., pp. 432-434. In reply, it may be said that my theory of the amnion has little in common with that of Van Beneden and Julin, which is the reason I did not cite them. My theory of the origin of the amnion, despite my critic, remains the only one which is tenable. In the same way, my theory of the genesis of the girdle-like placenta is equally safe from annihilation at the hands of morphologists. As I entertain a great respect for a vast mass of data which might be cited in proof of my position, I should be doing less than my duty not to insist upon standing by the latter.—*J. A. Ryder.*

PHYSIOLOGY.[1]

EFFECTS OF STIMULATING NERVE CELLS.—The fact that activity of a gland cell produces in the cell protoplasm changes, which may be recognized by the microscope, has long been known. Not only is the morphological appearance altered, but also the behavior of the cell toward staining reagents. The highly interesting fact that analogous changes accompany the activity of nerve-cells has been discovered by Donaldson and Hodge[2] in the case of the cells of the posterior root ganglia. Korybutt-Daszkiewicz[3] of the Warschau Pathological Laboratory endeavors to advance the subject one step further by showing that the activity of the cells of

---

[1] This department is edited by Dr. Frederic S. Lee, Bryn Mawr College, Bryn Mawr, Pa.

[2] Cf. *The American Journal of Psychology*, Vol. i, p. 479, 1888.

[3] *Archiv f. mik. Anatomie*, Vol. xxxiii, p. 51, 1889.